MicRadar

User Manual

Product Model: CDO-SYR60A0-03(HX)

Product name: 60G Radar module

Product Description: 60G, 1T3R, Tracking

Directory

1.Product introduction

This product is a high-sensitivity 60GHz millimeter-wave radar module, which mainly realizes the position detection of personnel targets in the radar coverage area.

This radar module mainly has the following features:

1) Based on the FMCW radar system , realize the function of two-dimensional or three-dimensional area personnel perception;
2) Using L-shaped antenna layout, it can realize distance and angle measurement in 3D space;
3) Realize the synchronous perception function of moving personnel and stationary personnel;
4) Possess the ability to recognize scenes, identify people/unmanned people and the activity status of people ;
5) Not affected by temperature, humidity, noise, airflow, dust, light, etc., suitable for harsh environments;
6) The output power is small, and the long-term irradiation will not harm the human body .

2.Scope of application

This product is mainly developed for the radar needs of Hisense TVs, and is suitable for TVs and related home appliances.

3.Main functions and performance parameters

3.1 Electrical performance parameters

parameter	minimum	Typical value	maximum value	unit
Power parameters				
Operating voltage (VCC)	4.5	5.0	5.5	V
Working current (I_{CC})		100	130	mA
Radar parameters				
Carrier frequency(f_{TX})	60		61.5	GHz
Signal Bandwidth		1.5		GHz
Transmit power (P_{out})			9.79	dBm
Radar system		FMCW		
Scanning period		70	80	ms
Antenna parameters				
Antenna Gain (G_{ANT})			5	dBi
Horizontal beam(FOV)	100	110	120	°

[1].The radar carrier frequency needs to be adjusted subsequently according to the user's needs.

3.2 Radar function and performance parameters

parameter	Min.	Typ.	Max.	unit
Moving target detection				
Detection distance		5.0		m
Distance accuracy		0.3		m
Detection angle		±50		°
Angular Accuracy		10		°
Reflection time		0.5		s
stationary person detection				
Detection distance		5.0		m
Distance accuracy		0.3		m
Detection angle		±50		°
Angular Accuracy		10		°
Reflection time		30		s
Other parameters				
Maximum detection		2		

number				
Minimum resolution distance for multiple people	1.5	2		m
Radar hot start time[1]			0.5	s
Radar cold start time[2]			5	s

Note:

[1]–The radar is restarted or stopped for a short time;

[2]–The radar is in shutdown mode for a long time.

3.3 Environmental suitability statement

1) Working temperature: -20℃～70℃
2) Storage temperature: -20℃～85℃
3) Humidity: ≤80%,no condensation;

4.Interface specification

4.1.Hardware Interface Description

The external interface of this radar uses GH125-S07CCA-00 (Shenzhen Jushuo Electronics,See Appendix) miniaturized vertical socket, and its interface is defined as follows

interface	definition	illustrate
1	5V	power input
2	HX-WAKEUP[1]	Manned or unmanned status indication
3	GND	GND
4	RST[2]	Radar reset terminal
5	RX	UART_RX
6	TX	UART_TX
7	GND	GND

Note:The upper pins 2, 4, 5 and 6 all use 3.3V TTL level, and the voltage range is shown in the table below.

Flag	definition	Min	Typ.	Max	Unit
V_{IL}	Low level	-0.5		0.8	V
V_{IH}	High level	2		3.3	V

[1]. STIN-Manned or unmanned status indication. H - There are people in

the current detection area; L - No one is in the current detection area;

[2]. RST - Radar reset control terminal. H-Normal working mode of radar;When H-level is converted to L-level and remains above 0.1ms, the radar resets.

4.2.Software interface description

The radar uses UART interface for external communication. For detailed interface information, please refer to the "Interface Protocol".

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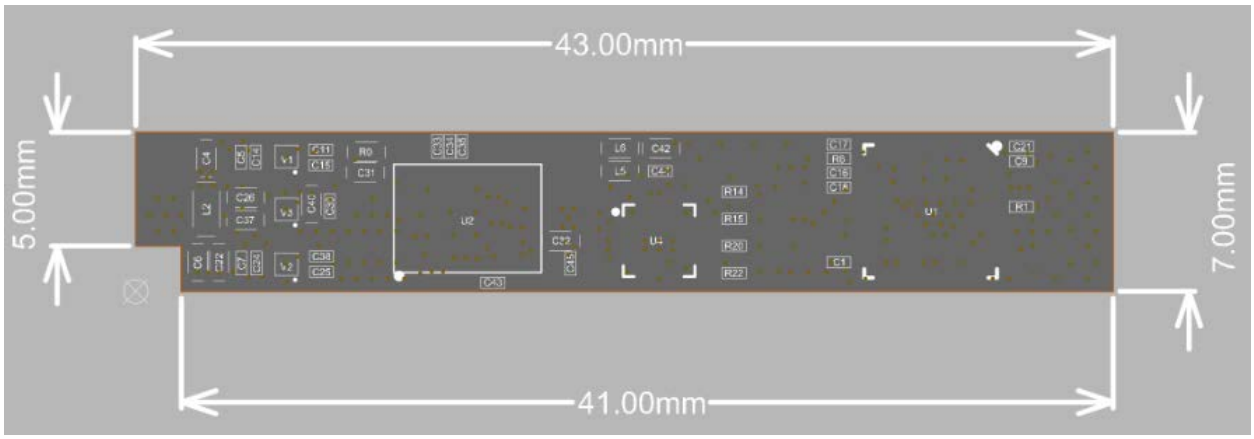
5.Pacts list

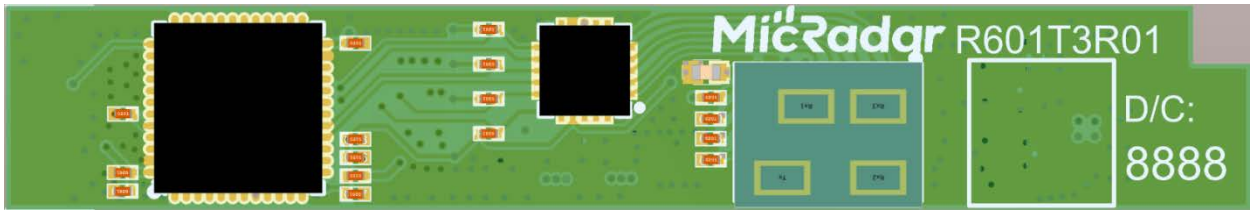
Sn	Description	Dosage	Supplier
1	0201□ 10nf□ ±20%□ 16V	1.00	EYANG/VIIYONG/FENGHUA/Samsung/CCTC
2	0201□ 470nf□ ±20%□ 10V	1.00	EYANG/VIIYONG/FENGHUA/Samsung/CCTC
3	0201□ 100nf□ ±20%□ 16V	14.00	EYANG/VIIYONG/FENGHUA/Samsung/CCTC
4	0201□ 1uf□ ±20%□ 6.3V	12.00	EYANG/VIIYONG/FENGHUA/Samsung/CCTC
5	0402□ 10uf□ ±20%□ 6.3V	10.00	EYANG/VIIYONG/FENGHUA/Samsung/CCTC
6	0402□ 0 ohm□ ±5%□ 1/16W	1.00	FENGHUA/FOSAN/uni-ohm
7	0201□ 10Kohm□ ±5%□ 1/16W	1.00	FENGHUA/FOSAN/uni-ohm
8	0201□ 4.7Kohm□ ±5%□ 1/16W	10.00	FENGHUA/FOSAN/uni-ohm
9	0201□ 150 ohm□ ±5%□ 1/16W	1.00	FENGHUA/FOSAN/uni-ohm
10	0201□ 1Kohm□ ±5%□ 1/16W	1.00	FENGHUA/FOSAN/uni-ohm
11	0402□600 ohm□100Mhz□±25%□ 200mA	5.00	Sunlord
12	0603□ 10uH□ ±20%□ 400mA	1.00	
13	0402□120 ohm□100Mhz□±25%□ 500mA	1.00	Sunlord
14	XDFN-4-EP(1x1),RS3236-3.3YF5	2.00	Song Yuan
15	XDFN-4-EP(1x1),RS3236-1.8YF5	1.00	Song Yuan
16	2016□ 80Mhz□ oscillator□ 1.8V□ ±20ppm	1.00	Song Yuan
17	QFN3*3-20L□ RS0208	1.00	Song Yuan
18	qfn48□ AT□ AT32F403ACGU7	1.00	Song Yuan
19	BGA□ IFX□ BGT60TR13C	1.00	Song Yuan
20	1.25T-7-NAWB□ GH1.25-7PIN-SMD	1.00	De Quan Sheng
21	DFN1006□ Vrwm 5V, PESDNC2FD5VBH	4.00	Prisemi
22	S7136H+FR4,PCB,BLACK	1.00	Song Yuan

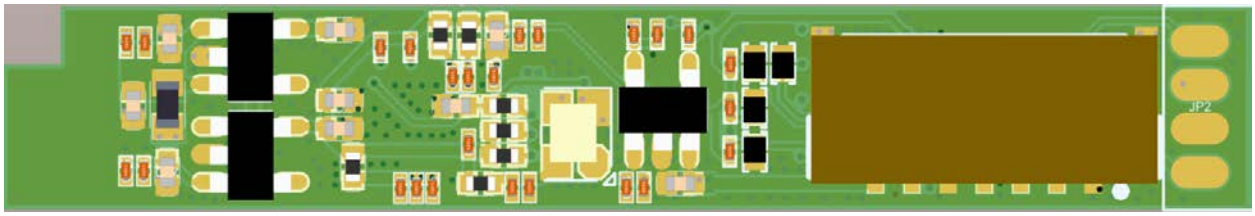
6.Dimensions and product photos

1. Product dimensions



2. Product appearance diagram





7.Installation and use instructions

This radar has the angle measurement function in two directions, horizontal and vertical. The horizontal installation method is shown in the figure below. This installation method is mainly for human detection in standing or sitting postures, such as living room, home appliance applications and other occasions.

Radar installation height is recommended to be 0.5m to 1.5m, the radar is

installed horizontally and forward, the installation inclination angle is $\leqslant \pm 10^{o}$, and there are no obvious obstructions and coverings in front of the radar.

The normal direction of the radar is aligned with the main detection position to ensure that the main beam of the radar antenna covers the detection area, and the radar beam covers the human activity airspace.

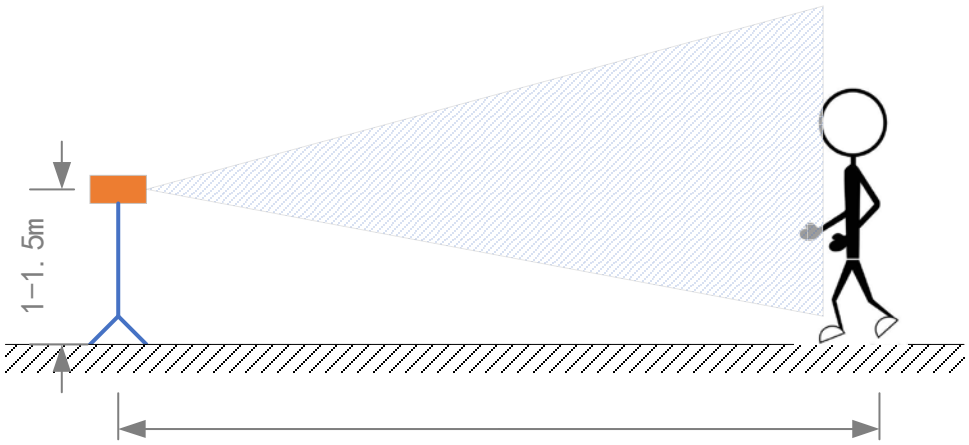


Figure 1Horizontal installation diagram

Notice:

A、 The different installation methods mentioned above all require the main radar beam to cover the main active area of the human body, and to face the normal direction as much as possible;

B、 When installed obliquely, due to the change of the horizontal projection of the coverage area, the horizontal action distance will be correspondingly reduced;

C、 When the module is working, the surface of the module should not be covered by metal objects;

D、 Affected by the transmission characteristics of electromagnetic waves, the radar operating distance is related to the target RCS, the material and thickness of the target covering, and the effective radar operating distance will change to a certain extent.

E、Corresponding to the detection of the human body in the static state, different body positions will affect the range of the radar, and the radar does not guarantee that all states can reach the maximum range.

8.FCCwarning

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

—Reorient or relocate the receiving antenna.

—Increase the separation between the equipment and receiver.

—Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

—Consult the dealer or an experienced radio/TV technician for help.

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment .

This transmitter must not be co‑located or operating in conjunction with any other antenna or transmitter.

This equipment should be installed and operated with minimum distance 20cm between the radiator &you body.

9.IC warning

This device complies with Innovation, Science and Economic Development Canada licence-exempt RSS

standard (s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference,including interference that may cause undesired operation of the device.

Le onjunc areil est conforme aux CNR d' l'innovation, la science et le développement économique Canada licables aux areils radio exempts de licence.

L'exploitation est autorisée aux deux conditions suivantes:

(1) l'areil ne doit pas produire de brouillage, et

(2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, onj si le brouillage

est susceptible d’en compromettre le fonctionnement.

Any changes or modifications not expressly approved by the party responsible for compliance could void the user’s authority to operate the equipment.

Tous les changements ou modifications non expressément approuvée par le responsible de la conformité pourrait vider l’utilisateur est habilité à exploiter l’équipemen.

ISEDC Radiation Exposure Statement:
This equipment complies with ISEDC RF radiation exposure limits set forth for an uncontrolled environment.
This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.
Cet appareil est
conforme aux limitesd’exposition de rayonnement RF ISEDC établiespour un environnement non contrôlé.
Cetémetteur ne doit pas être co-implanté oufonctionner en onjunction avec toute autreantenne ou transmetteur.